

Remarks

With entry of the present amendment, claims 1-11 are pending.

Drawings

The drawings were objected to for allegedly having “blackened out” regions. The application was originally filed with a Petition To Accept Color Drawings, along with three sets of color drawings for Figures 2, 4A-4E, 7A-7D, 8A-8B, 9A-9C, 10A-10E, 11A-11B and 12A-12B. The petition was granted in the Decision mailed February 28, 2005. The color drawings do not have “blackened out” regions. Applicants therefore respectfully submit that the color drawings that have been accepted via the Decision are suitable to permit examination, and respectfully request that the Office examine the application based on the set of color drawings (instead of any photocopy version in black and white or grayscale of these drawings that may be present in the file). If for any reason the Office would like yet another set of the drawings in color, Applicants are willing to provide such further set upon request.

Patentability Over Sloan and Heidrich

Claims 1-2 and 9-10 have been rejected under 35 U.S.C. § 103 as being unpatentable over Sloan in view of Heidrich. Applicants respectfully traverse the rejection.

The above-amended independent claims each recite limitations relating to meso-scale radiance transfer data representing radiance response to area lighting sampled over a meso-structure texture patch that is mapped over a surface of the object. In particular, claims 1 and 9 each recite, “calculating data of meso-scale radiance transfer for area lighting finely sampled over a meso-structure texture patch mapped over a surface of the object.” The cited art whether considered individually or in combination fails to teach or suggest this limitation. The amended

language “area lighting” finds support in the specification of the present application, at page 11, lines 26-27, and elsewhere.

As acknowledged by the Office, “Sloan fails to explicitly teach calculating data of meso-scale radiance transfer finely sampled over a meso-structure texture patch mapped over a surface of an object.” (Office Action mailed October 20, 2005, at p. 3.) The Office nevertheless asserts, “this is what Heidrich teaches.” Applicants respectfully disagree that Heidrich teaches or suggests to produce data representing meso-scale radiance transfer for area lighting.

Heidrich describes a technique for illuminating micro geometry based on precomputed visibility. (Heidrich, title.) The method can be applied to precomputing BRDFs. (Heidrich, p. 455, right column, second paragraph.) According to this method, the visibility information in various directions from various points on the height field is precomputed. (Heidrich, p. 455, right column, third paragraph; and paragraph straddling p. 456-457.) This precomputed visibility information can then be applied in a Monte Carlo integration algorithm to solve the rendering equation that provides the radiance for a given viewing direction from directional light in one incoming direction. (Heidrich, p. 456, right column, fifth paragraph, “This is necessary simply because the BRDF by definition is a function of exactly one incoming direction and exactly one outgoing direction.”) As such, the BRDF computed by Heidrich represents the radiance from directional light. (Heidrich, p. 456, right column, fifth paragraph, “Secondly, in the case where we want to use our method to compute a BRDF, we request that the height field geometry is small compared to the remainder of the scene, and therefore any incoming direct light can be assumed parallel.”) Because Heidrich discloses a method using precomputed visibility to compute a BRDF for directional lighting, Heidrich fails to suggest the above-discussed limitation relating to meso-scale radiance transfer data for area lighting.

For at least this reason, claims 1-2 and 9-10 are allowable over this art.

Patentability Over Sloan, Heidrich and Tong

Claims 3-8 and 11 have been rejected under 35 U.S.C. § 103 as being unpatentable over Sloan, in view of Heidrich and Tong. Applicants traverse the rejection.

Independent claims 4 and 11 also recite limitations relating to the meso-scale radiance transfer data is for area lighting. Claim 4 recites, “for a location on a surface of the modeled object viewed from a view direction in the graphics image, determining lighting transferred by the object at the location from the lighting environment as a function of ... a representation on the lighting basis of the radiance transfer for area lighting of a meso-structure of the object’s surface sampled at a meso-scale.” Claim 11 recites, “a meso-scale lighting simulator operating to perform a lighting simulation over a meso-structure patch for a plurality of views and lighting directions to produce a radiance transfer texture representing radiance transfer for area lighting of a set of meso-scale sampling locations over a meso-structure patch.”

As previously discussed, Sloan and Heidrich fail to teach or suggest the meso-scale radiance transfer data is for area lighting. Tong also fails to disclose meso-scale radiance transfer for area lighting. Tong describes a way to synthesize a bidirectional texture function (BTF) in a more compact representation. (Tong, at abstract.) As also discussed by Heidrich at p. 461, right column, last paragraph, the BTF differs from the BRDF in that the BRDF is a single sample that provides the average radiance in the view direction from the incident directional light for the height field as a whole; whereas, the BTF is a 6-dimensional function whose variables are the 2D position on the height field and the viewing and lighting directions. (Tong, p. 665, right column, first full paragraph.) Like the BRDF, however, the BTF also represents the radiance in a viewing direction for directional lighting.

Because Sloan, Heidrich and Tong all lack any suggestion of a radiance transfer texture representing radiance transfer for area lighting of a set of meso-scale sampling locations over a meso-structure patch, the claims 3-8 and 11 should be allowable over this art for at least that reason.

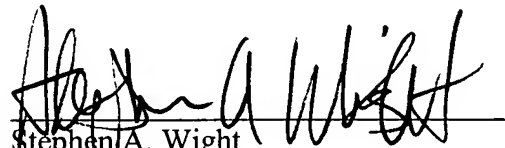
Conclusion

The claims should now be in condition for allowance for at least the reasons discussed above. Such action therefore is respectfully solicited.

Respectfully submitted,

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